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POTENTIAL OF BEAN SEED PRODUCTION IN THE DRY ZONE

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ABSTRACT

Bean seed production in Sri Lanka is restricted to the mid-country areas. However, severe land constraints in these areas is a limiting factor not only for production but also for quality control where maintaining minimum isolation between varieties is difficult. This study was done to determine the suitability of the dry zone for bean seed production, where land constraint is not severe and irrigation facilities are available. Experiments were conducted at the Post-Control Field at Mahailluppallama during both *maha* and *yala* seasons from 1996 to 1998. Three bean varieties, Top Crop, Wade and Kentucky Wonder Green were tested. All three varieties performed well during the *maha* season and produced seeds of acceptable quality. Kentucky Wonder Green performed best and produced seed yields exceeding 2000 Kg/ha at 700g per 1000 seeds and 76% germination whereas Top Crop and Wade produced seed yields of 860 Kg/ha and 474 Kg/ha at 342g and 327g per 1000 seeds, respectively. However, all three varieties failed during the *yala* season.

KEY WORDS: Bean seed production, Dry zone, Sri Lanka

INTRODUCTION

The common bean, an introduced crop, is a popular vegetable in Sri Lanka. It fetches a higher farm gate price than the substitute, local vegetable cowpea varieties and also satisfies the consumer by its palatability and fast cooking ability. World heritage bean varieties such as Kentucky Wonder Green, Top Crop, and Wade are still popular and most adapted to the mid-country areas with mild temperature regimes.

The short supply of good quality seeds of these cultivars is a major constraint to increase bean seed production. This could be attributed to the following reasons.

(i) Being introduced heritage varieties several years ago, adequate quantities of the authentic varieties are not available for import.

(ii) Local seed production being concentrated in Rikillagaskada area in the mid-country where land is a constraint and thereby bringing low income to seed growers. Therefore, bean seed growers have diversified to other crops resulting in low bean seed production in the country.

The present study was initiated to determine the potential of bean seed production in the dry zone that offers higher land holding sizes. Presently, no information is available on cultivation of beans in the dry zone for seed production. The study was conducted under irrigation to minimise the effect of water stress on seed quality.

MATERIALS AND METHODS

Experiments were conducted at the Post Control Field of the Seed Certification Service of the Department of Agriculture at Mahailluppallama starting during the *yala* season 1996 and repeated during four cultivation seasons until *yala* 1998. Two bush bean varieties (Top Crop and Wade) and one climbing variety (Kentucky Wonder Green) were tested. The experiments were laid down in a randomized complete block design with 7 replicates. Climbing types were planted at a spacing of 60 X 40 cm and the bush type at a spacing of 50 X 40 cm. Basal fertilizer (Urea 190 kg/ha, TSP 285 kg /ha, Muriate of Potash 150 kg/ha) was applied before planting. First weeding was done at 4 weeks after planting and first top dressing of fertilizer (125 kg/ha) was applied at the same time. Second weeding was done at eight weeks after planting before the second top dressing of fertilizer. Furrow irrigation was provided daily until germination was completed followed by irrigation once in three days until the crop was harvested.

Pods were harvested at maturity, indicated by pods turning yellowish brown in colour (65-75 days after planting). The pods were sun dried and seeds were separated manually. Extracted seeds were tested at the Seed Testing Laboratory, Mahailluppallama for viability, germination and 1000 seed weight.

Viability Test

The tetrazolium test prescribed by the International Seed Testing Association (ISTA) in 1999 was used. Bean seeds were conditioned on moist paper towels overnight before staining. The seed coats were removed carefully and placed in tetrazolium chloride (1%) solution and incubated in the dark at room temperature for three hours. Stained seeds were counted as viable (International Rules for Seed Testing, 1999).

Germination Test

Bean seeds were germinated in sand boxes with transparent lids in 4 replicates, using 25 seeds in each replicate. The boxes were re-watered during the germination period. Boxes were kept in 20-30° C for 9 days and seeds that showed normal germination as prescribed by ISTA were counted as germinated.

Climatic Data

Temperature and rain fall data were obtained from the meteorological station at Mahailluppallama for the five seasons.

RESULTS AND DISCUSSION

General observations during *yala* cultivation season

Though the vegetative growth phases of all 3 varieties were satisfactory, the reproductive phases failed completely after flowering during the three *yala* seasons. Plants were affected by yellow mosaic virus, anthracnose and dry rot at the pod bearing stage. Control measures failed to bring any satisfactory results and therefore no seed yields were obtained.

General observations during *maha* cultivation season

In contrast to *yala* season, both bush and pole beans grew well to full maturity. At the pod bearing stage, a few plants were infected by yellow mosaic virus with no significant effect on yield. Seed yields obtained from both Maha seasons and the average seed yield obtained from the three varieties are given in table1. Average yield of Kentucky Wonder Green (KWG) was 2050 kg/Ha. The average yield obtained from Top Crop was 860 kg/Ha whereas the average seed yield of Wade was 470 kg/Ha. Therefore, significant differences in seed yield between varieties were noted. The variety, Kentucky Wonder Green gave the highest seed yield and the variety, Wade gave the lowest seed yield.

The results of the germination test, viability test and 1000 seed weight are given in table 1. Seed viability was excellent (table 1) and germination was within the acceptable percentage (75%) prescribed by the DOA. The1000 seed weight of all three varieties was good. However, seeds of Kentucky Wonder Green were heaviest and weighed approximately 760 g per 1000 seeds whereas Top Crop and Wade seeds weighed nearly 340 g and 325 g per 1000 seeds, respectively.

Experiments conducted in India had shown that high temperature (27-32 C) reduced pod production in French bean even though branching and flowering were increased (Kigel, *et al.*,). The temperature regimes during experimentation at Mahailluppallama were higher, averaging 34.0^0 C in *yala* and 30.3^0 C in *maha*. Therefore, the temperatures recorded during *yala* season were at least 2^0 C higher than the highest in the Indian study and perhaps contributed to total crop failure. Climatic data are presented in table 2.

Table 1. Percentage of germination, viability, 1000 seed weight and seed yield of the three bean varieties, Top Crop, Wade and Kentucky Wonder Green grown during *maha* season at Mahailluppallama

Variety	*Germination*	*Viability*	*1000 seed Weight*	*Seed Yield kg/ha*
Top Crop	85	98	342g	860
Wade	78	94	327g	974
KWG	86	89	752g	2051

Table 2. Climatic Data Recorded During 5 growing Seasons at Meteorological Station, Mahailluppallama

Season	*Temperature*	*Rainfall (Monthly Avg)*
1996 *yala*	33.4 C	70 mm
1996/97 *maha*	30.4 C	162 mm
1997 *yala*	34.2 C	131 mm
1997/98 *maha*	30.3 C	353 mm
1998 yala	34.6 C	114 mm

Kentucky Wonder Green gave seed yields approximating 2000kg/ha. These yields were similar to the yields obtained by farmers in the mid-country (Maharouf and Nagendran, 1993).

CONCLUSION

There is a great potential to produce bean seeds of both bush and climbing types in the dry zone. However, production has to be restricted to the *maha* season. The quality of the seeds in terms of germination potential and 1000 seed weight was excellent. Of the three varieties tested, Kentucky Wonder Green was superior in terms of seed yield compared to Top Crop and Wade.

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